WASHINGTON
SCIENCE TRENDS

HIGHLIGHTS

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* JET FUEL CONTAMINATION

Fungus growth continues to plague users of jet fuels, with "no solution in sight" according to Army aviation authorities. Improvements in fuel handling, fuel additives and improved fuel cell coating, however, may be of some assistance. The fungus (Hormodendrum Hortei) grows in pipelines, storage tanks or aircraft fuel lines and tanks. In addition to clogging filter screens and fuel lines, the fungus is said to be highly corrosive.

(The Army has asked that proposed solutions be forwarded "immediately" to R. W. Edwards, USA Chemical Corps, Biological Warfare Laboratory, Fort Detrick, Md.)

* METEOROLOGICAL DATA SYSTEMS

Weather Bureau officials state that a high-quality international radio facsimile network is "urgently required" for the worldwide distribution of weather advices and analyses based on meteorological satellite data. They add that "U. S. leadership is essential to demonstrate such a need, and to develop the equipment and techniques."

Also required:

✓ Higher speed, higher quality, more dependable radioteletypewriter and cable facilities to carry continually increasing amounts of necessary information, and to provide it reliably and rapidly to computer centers which have been established for data handling and forecasting.

✓ Regional electronic computer centers are envisioned which would receive, process and distribute data on an interregional basis.

Note: The U. S. National Meteorological Center already receives approximately 8,000 surface observations each 6 hours from the Northern Hemisphere, plus 3,000 miscellaneous upper air and ship reports. This extensive input is supplemented by separate transmissions among domestic and international airports for so-called operational purposes -- providing advices for aircraft.

* HIGH PERFORMANCE HELICOPTER

The Army and Sikorsky aircraft have completed a joint design study of a high-performance helicopter based on the dynamic components of the HSS-2 helicopter, Sikorsky S-61. The proposed craft would be capable of carrying a two-ton payload at a top speed of 181 kt and cruising speeds up to 174.1 kt. Top speed without payload is 192.1 kt. Ferry range is said to be 2,400 miles. The 4,000 pound payload involves a 150 mile range at design cruise speed. Payload could reportedly be increased to over 7,000 pounds by cutting cruise speed to 150 kt -- considerably higher than current helicopters. The fuselage would seat 20 troops.

* NAVY SEES ADVANTAGES IN TRANSPARENT PACKAGING

Tests by the Navy indicate a number of advantages in transparent packaging with the aid of plastics which have become important in consumer and industrial markets during recent years.

✓ Time and Money Saver: Under present operations Navy supply items are stored for long periods of time, requiring periodic inspection to determine condition. This means that packages must be opened, inspected and repackaged. Transparent materials would mean that this process could be largely eliminated. Another important problem is exact identification of the many items in the supply system. In addition, naval vessels, and particularly submarines, often lack adequate storage space so that much conventional packaging is removed to make room. This often exposes such items to damage.

✓ Transparent Packaging Methods: Packaging methods available for military use include the flexible pouch such as a plastic film wrap; the skin package, a conforming semi-rigid package made by draping a heat-softened film or sheet over the item and evacuating the air and blister packages, semi-rigid or rigid pre-formed sheets loosely conforming to the contours of the item.

The Navy has tested in its laboratories a number of such packaging concepts and has put forth these recommendations, which may be of value to others facing similar problems:

□ Transparent packaging films are available which can be advantageously used by the military when the visibility feature is required. Although no one film is currently available as an "all-purpose" packaging, certain individual films or laminations may be used.

□ Four mil low density polyethylene is a versatile and very useful material but it is not properly effective when used with military preservatives and its moisture vapor transmission rate is higher than that required.

□ Nylon has excellent oil resistance properties but undesirable side effects may arise both before and after contact with preservatives because of high moisture transmission rate. However, proper use of this material -- such as a pouch filled with oil -- can be advantageous.

□ Laminations of materials are said to provide the answer to many of the difficulties encountered with the other materials, although cost is presently a limiting factor. Laminates of polyethylene or mylar are said to provide excellent grease and oil resistance and toughness despite "fair" moisture vapor transmission rates. Laminations of nylon and polyethylene might prove most satisfactory.

□ Automatic equipment using such films, as in blister or skin packages, could conceivably reduce the cost of the package so that they could be directly competitive with presently used opaque materials.

□ Static Electricity, which can accumulate on transparent films, may provide problems which should be studied. Production rates could be decreased because of the tendency of the film to be attracted to itself. The static charge also attracts dirt and dust particles. However, these problems are not considered to be serious.

(A complete report on the requirement for such materials, as well as test information and recommendations, is now publicly available in Engineering Report No. 2.5082, U. S. Naval Supply Research and Development Facility. Copies may be obtained through military channels or at $2 from OTS, U. S. Department of Commerce, Washington 25, D. C. Ask for PB 171 532)

TECHNICAL TRENDS

- The latest list of Atomic Energy Reports is now available without charge from OTS, U. S. Department of Commerce, Washington 25, D. C. Ask for AEC Research Reports Price List No. 36. /// McDonnell Aircraft, St. Louis, Mo. will be responsible for development of the airframe and ramjet engine of the new Typhon missile, for which the Bendix Corp. has received a prime contract. /// Government surveys indicate a sharp increase in U. S. imports of photographic paper, particularly unsensitized, baryta coated, during the first half of 1961. Details of these and related imports are available in Announcement BD 61-162 from the Scientific, Photographic Division, BDSA, U. S. Department of Commerce, Washington 25, D. C. /// The Westinghouse Lamp Parts Department, Bloomfield, N. J. reports a practical method has now been developed to produce large single crystals of tungsten of extremely high purity and density. /// The first of a series of engineering drawings of prototype instruments for training in radioisotope engineering is now available from the Atomic Energy Commission. A catalog-price list can be obtained free of charge from the Office of Technical Information Extension, P. O. Box 62, Oak Ridge, Tenn. Ask for TID-4100 -- Engineering Materials List, and see code numbers CAPE 811-812-813.

- International Business Machines, Rockville, Md. has received a $507,000 Navy contract to develop a high volume production system for the continuous manufacture of thin film subassemblies. The Navy will "encourage" other companies to set up similar production lines. /// The Air Force is conducting a survey to determine industry interest and capability for operation of a liquid oxygen generating plant of multiple units of 75 ton per day capacity. For details contact J. R. Blazi, MAPGC, Middletown Air Materiel Area, Olmstead Air Force Base, Pa. /// The Atomic Energy Commission has found some encouraging preliminary results in a program to determine whether high level radioactive wastes could be stored safely in impermeable bedrock underlying the site of its Savannah River plant at Aiken, South Carolina. /// Information on an "improved standard observer for colorimetry" is available from the National Bureau of Standards, Office of Technical Information, Washington 25, D. C.

- Stevens Institute of Technology, Hoboken, New Jersey has received a $172,000 Army Signal Research and Development Laboratory contract to develop methods of generating relativistic plasma, for study of the kind of matter composing the Van Allen radiation belts. /// A brief report on potentially useful food and industrial products which may be developed from gels and foams made from refined soybean protein is available from the Information Office, U. S. Department of Agriculture, Washington 25, D. C. Ask for Announcement USDA 2969-61. /// A brief new listing of basic research contract and grant awards (Release No. 9-61-1) is available from the Office of Information, Office of Aerospace Research, Washington 25, D. C. /// The Publications Office, U. S. Bureau of the Census, Washington 25, D. C. has available Report BDSAF-363B(61)-2, a one page summary of communication equipment production in the U. S. during the second quarter of 1961.

- The U. S. Government has translated a major Soviet work on efforts to develop optical devices for solar-electric power purposes. /// The 257 page study (AEC TR 4471) is now available at $3.50 from OTS, U. S. Department of Commerce, Washington 25, D. C. /// A fact sheet on the "second round" nuclear power plant proposals invited under the joint U. S.-Euratom program is now available from the Division of Internal Affairs, U. S. AEC, Washington 25, D. C. /// Rocket Power, Inc., Mesa, Arizona has received an Office of Naval Research contract for studies which include fluorocarbon derivatives perchloryl fluorocarbons and fluorocarbon hypofluorites. /// Information on a special course and international conference on Activation Analysis to be held in Texas in December is available from R. E. Wainerdi, Texas A.& M., College Station, Texas. /// Radio Corporation of America official D. Brainerd Holmes will direct the new Houston, Tex. "command center" for manned lunar and interplanetary exploration.

□ RECLAIMING SCRAP JET ENGINES: Studies by the U. S. Bureau of Mines indicate that there are no "insurmountable" problems in recovering simple master alloys or single metal components from discarded and scrapped S-816 alloy. The investigation was aimed at finding new uses for an ever-increasing accumulation of rejected and wornout jet engine turbine buckets. Several experimental methods were employed in the Bureau studies, none of them completely successful. However, continuous improvement of product quality "strongly indicated that satisfactory grades of materials can be produced."

(For further details, see Report of Investigations No. 5786. Single Free Copies available from U. S. Bureau of Mines, 4800 Forbes Avenue, Pittsburgh 13, Pa.)

□ ABRASIVE DRILL: Patent applications have been filed for a new type abrasive drill for drilling deep holes in masonry materials such as concrete, stone, glass, ceramic and brick. The portable and lightweight device employs a high velocity stream of air or fluid containing abrasive particles. A suction-retrieving element separates the used abrasive particles from accumulated particles for re-use during the piercing of a material. Advantages are said to include a minimum accumulation of dirt and a major reduction of noise and vibration generally accompanying other types of drills or air hammers. Under terms of the patent application, the invention may be manufactured and used by or for the government for governmental purposes without the payment of any royalty.

(Development by A. E. Dilliar, Technical Service Department, U. S. Army Engineer Research and Development Laboratories, Ft. Belvoir, Va. and E. L. Mifflin, Jr., former Chief, Technical Service Department)

□ THREE COLOR PYROMETER: The National Bureau of Standards has developed a prototype high-speed three color pyrometer said to be capable of making 1000 temperature determinations per second in the temperature range 1000 to 3000° C -- with an uncertainty of about one percent. Potential applications are believed to include the measurement of missile components during firing tests, of ablating nose-cone materials and -- with modifications -- exploding wires. The device is said to avoid many of the limitations of one and two color pyrometers.

(For further information on "High-Speed Three-Color Pyrometer" write National Bureau of Standards, Office of Technical Information, Washington 25, D. C.)

□ CERAMIC "SPONGES" FOR RADIOACTIVE WASTES: An Atomic Energy Commission installation plans to use ceramic "sponges" for disposal of high-level radioactive wastes. High porosity ceramic balls are provided with a bisque finish after being fired at 1100° C to give them mechanical strength, and "virtually zero leachability". Experiments indicate that the sponges will be able to take up more than 40 percent of their volume of liquid waste -- and may hold twice their volume by a process of repeated soaking and drying cycles. The method is believed to have important advantages over liquid storage in tanks which could develop leaks, or be damaged by an act of nature or war. The inert material can be disposed of easily in a contaminated waste pit, or perhaps even in the ocean.

(Research and Development by Group H-7, Los Alamos Scientific Laboratory, Albuquerque, New Mexico and Coors Porcelain Company, Golden, Colorado)

□ MOBILE LIBRARY CAMERA: The Census Bureau is building a group of mobile cameras to operate among the stacks of the National Library of Medicine. The unit includes a late-model flat-bed camera and a power-driven adjustable bookrest so that pages will lie flat for microfilming.

(Development by Office of the Assistant Chief of Staff for Development, Machine Tabulation Division, U. S. Bureau of the Census, Washington 25, D. C.)

NAVAL RESEARCH PROGRESS REPORT

The Navy has published the complete unclassified proceedings of its April, 1961 Science Symposium at Annapolis, Md. at which engineers and scientists from Naval laboratories throughout the nation presented reports on programs and progress. These reports are now available in three volumes, at the prices indicated. Orders should cite Volume Number, and should be directed to Sales Office, OTS, U. S. Department of Commerce, Washington 25, D. C.

Volume I -- AD 260 234 -- $5

Queuing Theory □ Optimum Interception of Ballistic Missile at Moderate Range □ Fairing of Shiplines on Digital High Speed Computer □ Reliability of Thermal Conductivity Data on Thermoelectric Materials □ Unified Method of Aeroelasticity □ Transient Temperatures □ Re-Entry Heating Simulation on a Digital Computer □ NRL Coating for Niobium □ Determination of Thermal Sensitivity of Priming Materials □ Radiation Behavior of Electrical Materials & Components for Space Vehicles □ Quantitative Chemical Analysis of Microscopic Areas & Vehicles □ Effects of Irradiation on Magnetic Properties of Alloys & Ferrites □ Yield & Fracture of Columbium □ Free Radicals & Radiation Damage in Polymeric Materials □ Ice-Phobic Coatings for Deicing Naval Vessels □ Solid State Research □ Infrared Spectral Emissivity of Optical Materials □ New Thermoluminescent Dosimeter □ Determination of Crystal & Molecular Structure □ Measurement of Plasma Temperatures in the 10,000,000 K Range □ Equation of State of Gaseous Metallic Plasmas □ Infrared Atomic Spectra of Fourth Group Elements

Volume II - AD 260 240 -- $6

Advances in Collection & Storage of Whole Blood □ Analysis of Contaminants in Aviators' Breathing Oxygen □ Problems of Nitrogen-Free and Carbon Dioxide-Rich Artificial Atmospheres □ Physiological Regulation of Human Body Temperature □ Incident & Tissue Dose in Proton Radiation Fields in Space □ Thermoelectric & Thermionic Energy Conversion □ Design of High-Energy Batteries for Optimum Power Transfer □ Recent Results in Hero Research □ Recent Hydrodynamics Research □ Damping of Hulls by Use of Visco-Elastic Materials □ Investigation of Ultraviolet Curing Polyester Systems □ Jet-Arc Image Furnace as a High-Temperature Research Tool □ Mean Lifetime of the Neutral Pion □ Surface Chemical Methods of Displacing Water and/or Oils & Salvaging Flooded Equipment □ Crosslinking Agents for Phosphonitrile Polymers □ Unimolecular Decomposition of Vibrationally Excited Molecules □ Alkyl and Vinyl Aluminum Hydrides □ Stoichiometry of Melt-Grown Compound-Semiconductor Crystals □ Vibrational Spectra of Ammonium & Potassium Perchlorates □ Chemical and Catalytic Chemical Reactors for Heating or Cooling Equipment □ Identification of Character & Behavior Disorders in Military Life □ Concept of System Equalization in Operator Selection & Training □ Some Limitations of Human Decision Makers □ Effects of Sequence of School & Fleet Training on Attitude & Job Performance of Enlisted Personnel □ Auditory Problems in the Navy □ Method for Determining Training Device Requirements □ Machines as Training Devices □ Research in Tracking Training □ Dynamics of Leadership in Organization

Volume III - AD 260 241 -- $6

Solid State Research at NOTS □ Behavior of 30-Kev Space-Charge-Limited Electron Beam Injected into Hydrogen at Low Pressure □ Meteorological Aspects of Radio Propagation in Trade-Wind Areas □ A Study of the Oceanic Duct Between San Diego & Hawaii □ Materials & Techniques for Thin Film Microelectronics □ Noise Effects in Photoconductive Infrared Detectors □ Frequency Response of Nonlinear Systems □ Constricted Hysteresis Loops of Unpolarized Polycrystalline Barium Titanate Energy Loss, Coercivity and Remanent Polarization □ High Performance Ships - Promises & Problems □ Ground Effect Machine R&D in U. S. □ Nuclear Submarine Habitability □ Linearized Theory of Vented Hydrofoils □ Small Water Waves □ Oceanography & Naval Underwater Ranges □ Cathode-Ray Polarography, New Tool in Chemical Oceanography □ Recent Results in Upper Atmosphere Research □ Methods of Calculating Pre-Burned Propellant Gun Performance □ NOTS Deep Sea Research Vehicle □ Beach Processes □ NOTTY - Study of Sea Animal Propulsion and Acoustics

PUBLICATION CHECKLIST

- ☐ BRITTLE MATERIALS FOR STRUCTURES, a study of the possibilities and limitations in the unique mechanical and physical properties of brittle materials for use in tensile structures such as gas turbines, rocket casings and nozzles and re-entry vehicles. 33 Pages. Single Copies Free to Government Agencies, their contractors, subcontractors and suppliers. (Write Defense Metals Information Center, Battelle Memorial Institute, Columbus 1, Ohio for DMIC Memorandum No. 107)

- ☐ SMALL BUSINESS AND GOVERNMENT PROCUREMENT, recent testimony, statements and exhibits on the never-ending struggle between the Pentagon and the Congress to provide more opportunities for small business firms. 127 Pages. Single Copies Free, as available. (Write Select Committee on Small Business, Subcommittee on Government Procurement, U. S. Senate, Washington 25, D. C. for "The Role of Small Business in Government Procurement - 1961")

- ☐ TRENDS IN ENGINEERING EDUCATION, a study of some of the more important changes in engineering education. 67 Pages. 45 cents. (Write Superintendent of Documents, Government Printing Office, Washington 25, D. C. for Publication No. FS 5.256:56003)

- ☐ PLASTICS DIRECTORY, a first-class directory, including addresses, and telephone numbers, of civilian and military officials in all branches of the Armed Forces concerned with the many applications of plastics. An item-by-item index should make this loose-leaf publication doubly valuable to industrial and research organizations. (Plastec Report No. 5 ((PB 171 036)) available through military channels or at $2.75 from OTS, U. S. Department of Commerce, Washington 25, D.C.)

- ☐ RADIOLOGICAL MONITORING SYSTEM, a system analysis by Edgerton, Germeshausen and Grier, Inc. for the Atomic Energy Commission outlining in detail the electronic design of an airborne radiological monitoring system planned for installation in a Beech Model 50E aircraft. 54 Pages. (Report CEX 59.4 available through AEC channels or at $1.25 from OTS, U. S. Department of Commerce, Washington 25, D. C.)

- ☐ CLEANING AND PURIFYING AIR IN BUILDINGS, the Proceedings of a 1960 Conference sponsored by the National Academy of Sciences outlining varibus current problems and projects and some future research needs. 61 Pages. $4. (Write Printing and Publishing Office, National Academy of Sciences, 2101 Constitution Avenue, Washington 25, D. C. for Publication No. 797)

- ☐ ALUMINUM HYDRIDE, a Lockheed Corp. report reviewing the existing unclassified literature, including methods of preparation and physical and chemical properties. 19 Pages. (Report LMSD 703150 ((PB 171 534)) available through military channels or at 75 cents from OTS, U. S. Department of Commerce, Washington 25, D. C.)

- ☐ EXAMPLES IN ELECTRONIC TECHNOLOGY, a completely revised British Admiralty text designed to provide naval students of electrical technology with a selection of work examples and graded exercises. 487 Pages. $3.60. (Write British Information Services, 45 Rockefeller Plaza, New York 20, New York.)

- ☐ SMALL BUSINESS ADMINISTRATION, 1961, the transcript of an annual review of the operations of the SBA, with some Congressional concern over small business participation problems in Government Research and Development programs. 103 Pages. Single Copies Free. (Write Select Committee on Small Business, U. S. Senate, Washington 25, D. C.)